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(54) **MORTISE AND TENON ADAPTERS FOR DOVETAIL JIGS**

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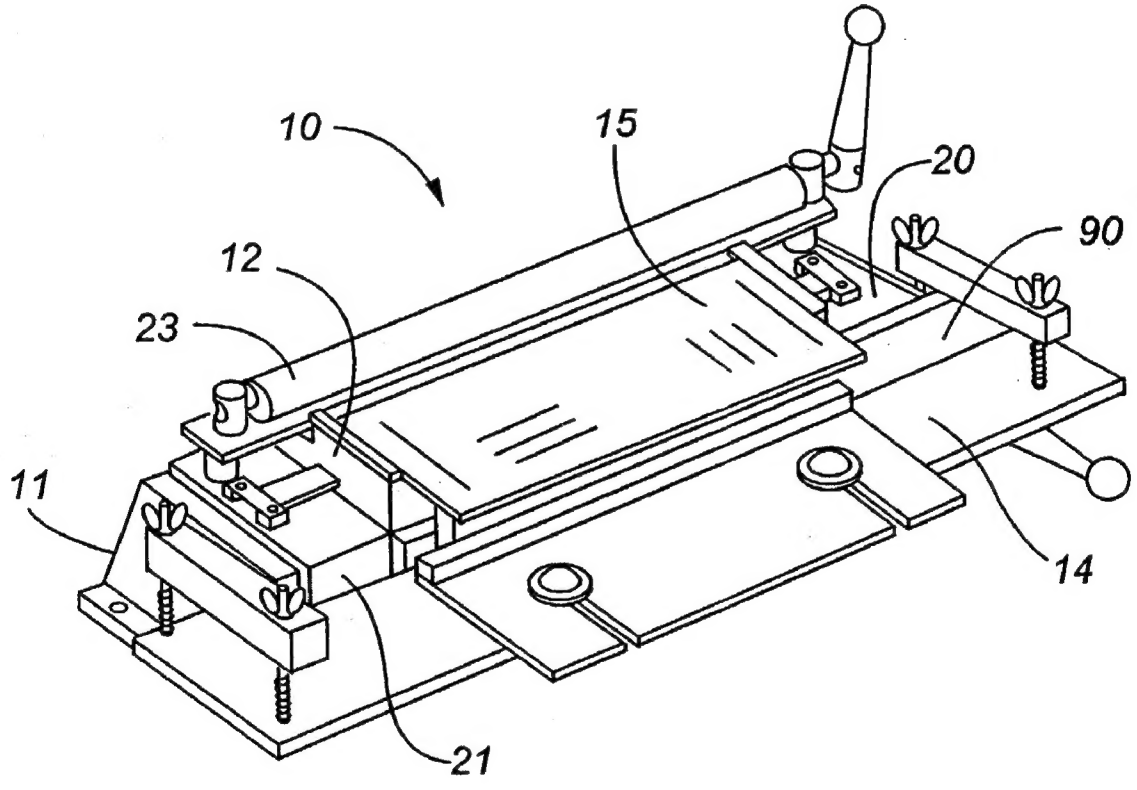
(57) **ABSTRACT**

A mortise and tenon joint adapter system for use with a dovetail jig base and a router has a template support, a mortise shelf, mortise and tenon templates, and a layout guide. The template support mounts on the jig base and the templates mount on the template support. The mortise shelf mounts on the jig base, is vertically adjustable and clamps laterally extending mortise work pieces. Mortising and tenoning slots on the templates provide two sided guidance and full support for the router. Movable stops in the slots provide length adjustability for mortises and tenons. The layout guide assures precise layout of mortises and tenons created with the templates.



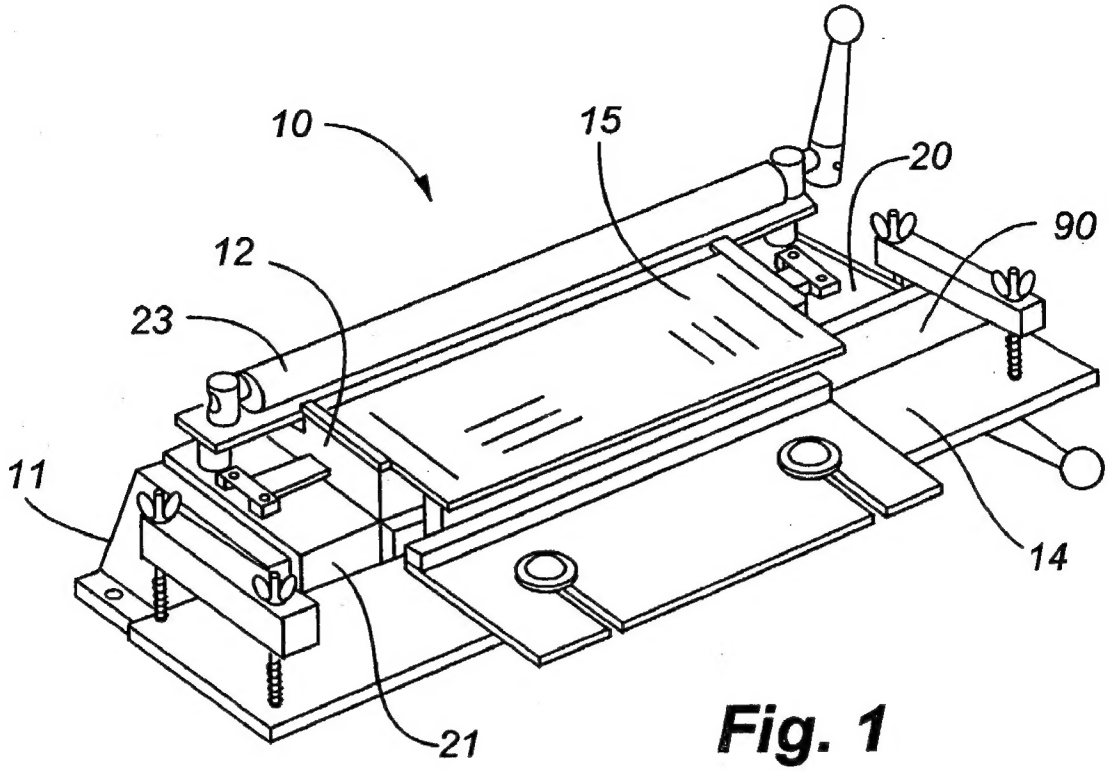


Fig. 1

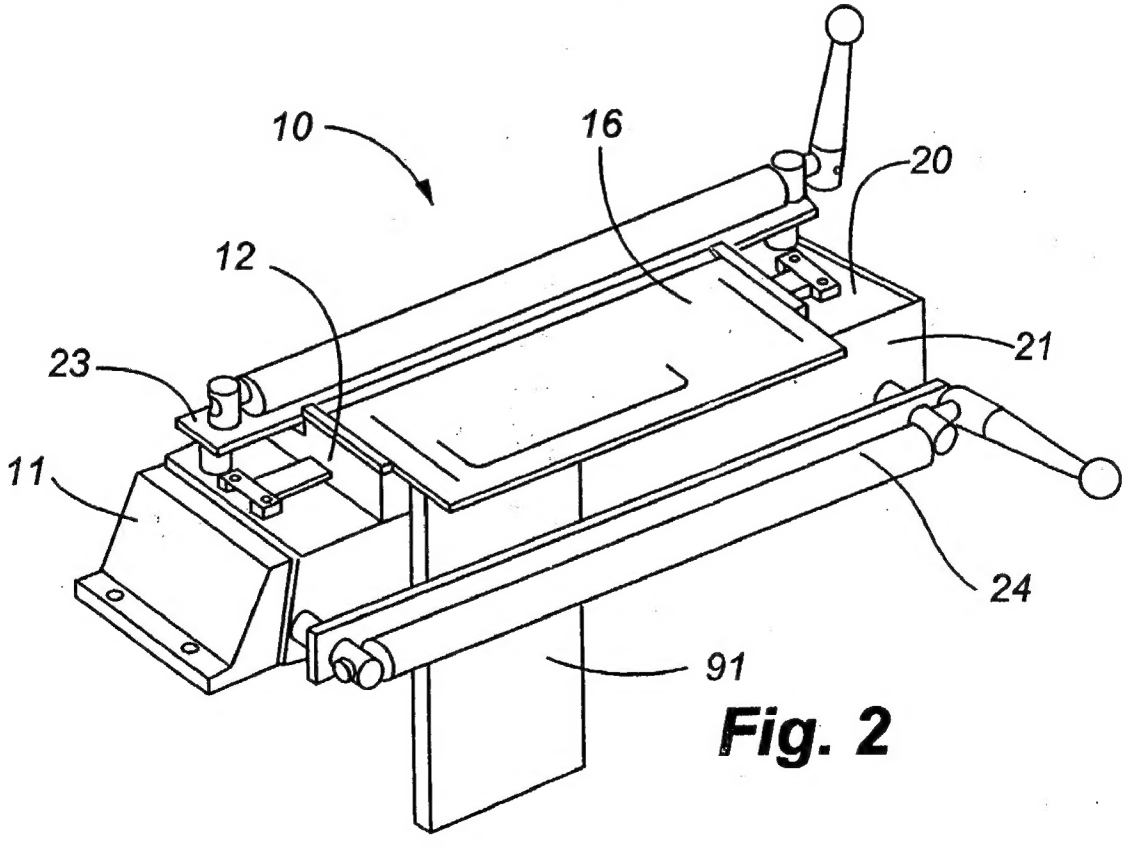


Fig. 2

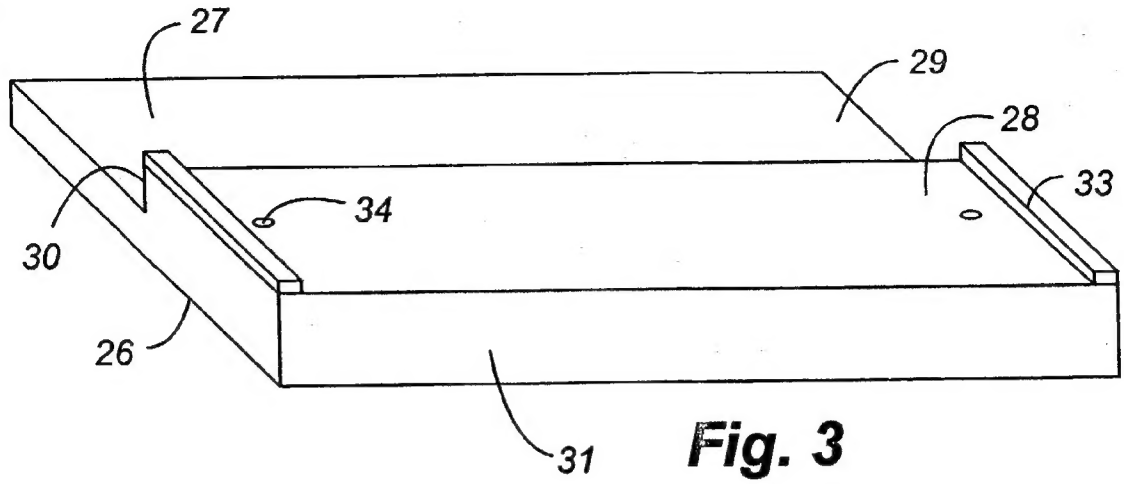


Fig. 3

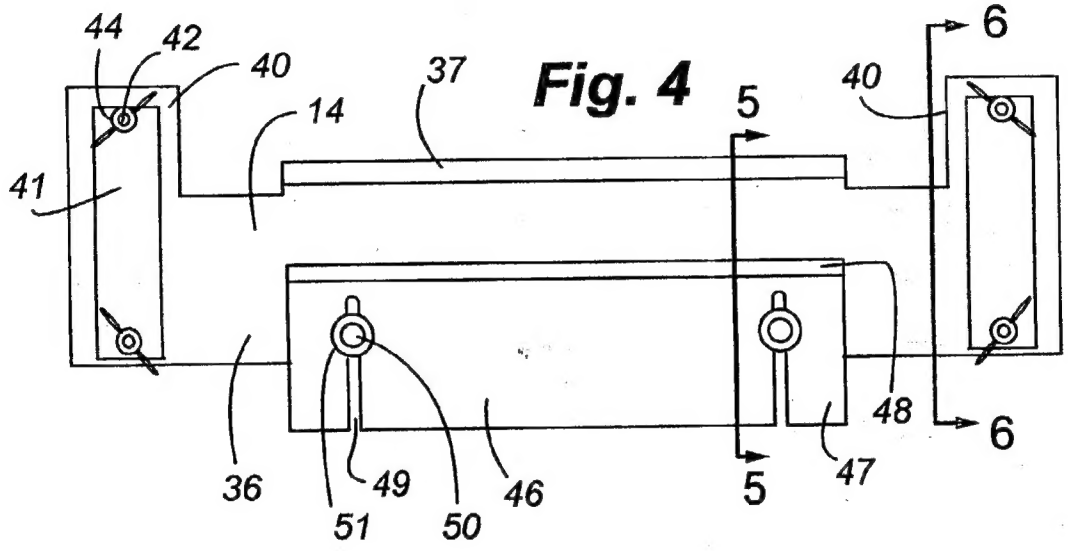


Fig. 4

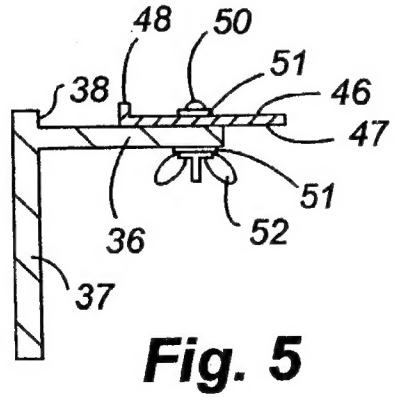


Fig. 5

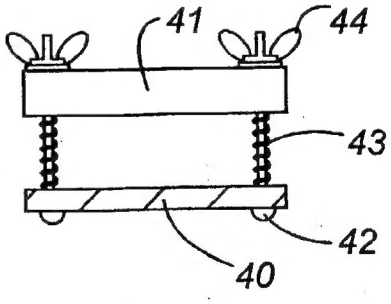


Fig. 6

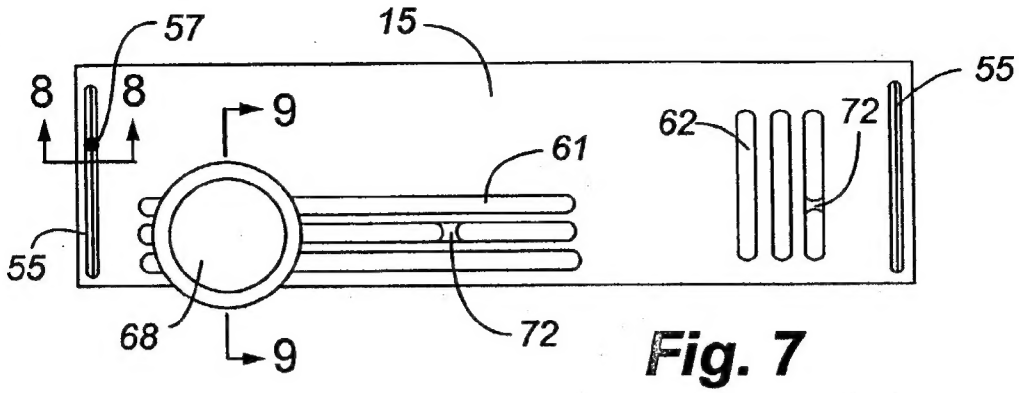


Fig. 7

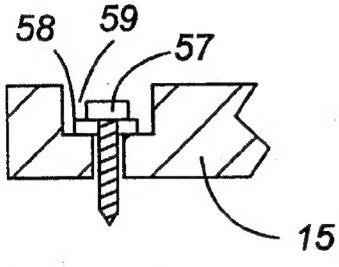


Fig. 8

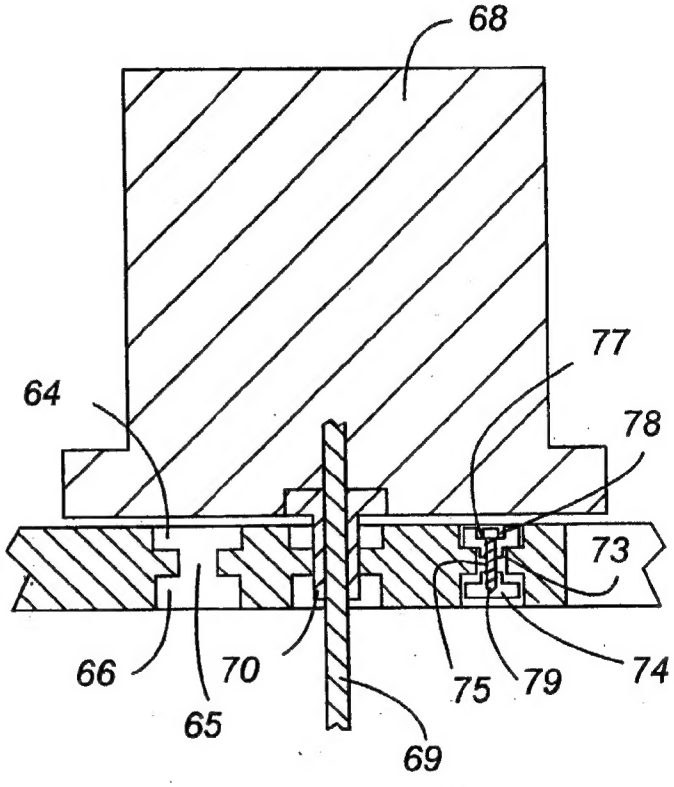


Fig. 9

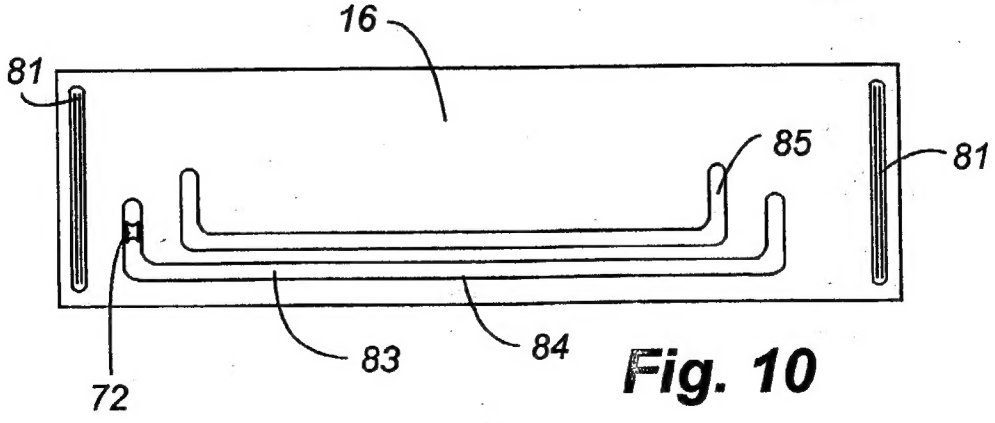
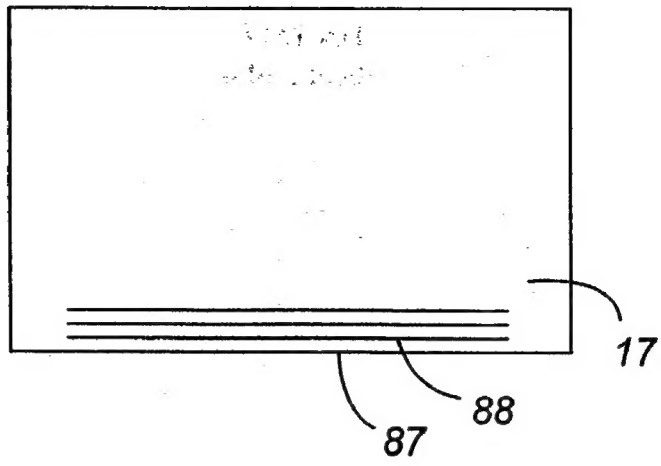


Fig. 10

Fig. 11



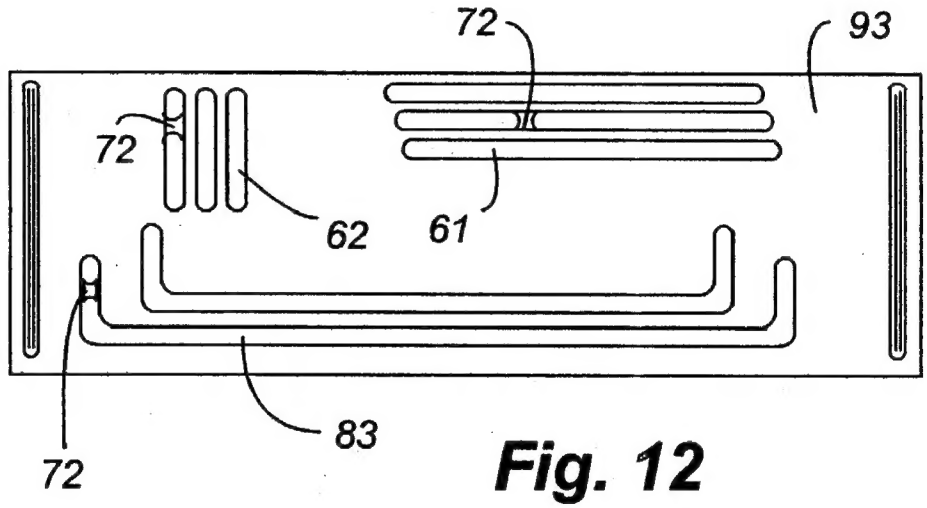
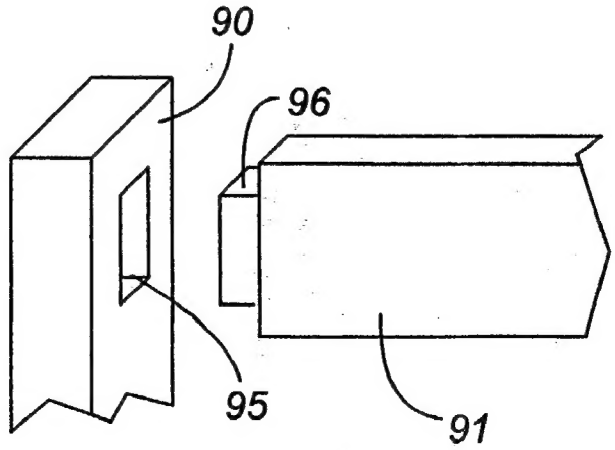


Fig. 12

Fig. 13



MORTISE AND TENON ADAPTERS FOR DOVETAIL JIGS

[0001] This application claims the benefit under 35 U.S.C. § 119(e) of the U.S. provisional patent application No. 60/389,203 filed Jun. 17, 2002.

TECHNICAL FIELD

[0002] The present invention relates to woodworking tools and more particularly to a system for making mortise and tenon joints using the base of a dovetail jig.

BACKGROUND ART

[0003] Relatively inexpensive jigs have been designed to produce dovetail joints and finger joints, with a powered router, to joint board ends. Generally such jigs have a base and a finger template. The base has a top surface with a top hold down bar and a front surface with a front hold down bar. For half-blind dovetail joints, the pin board is clamped with the top hold down bar onto the top surface of the base with the end flush with the front surface, and the tail board is offset laterally from the pin board and clamped with the front hold down bar onto the front surface of the base with the end flush with top surface of the pin board.

[0004] The finger template extends over the pin board, and has legs that extend down on either side of the pin board to mount on the base. The finger template is vertically adjustable to accommodate different thicknesses of pin boards. The finger template has a plurality of spaced, forwardly projecting fingers. A router sits on the fingers and, with a guide bushing and an upwardly tapering, dovetail bit, cuts the sockets and tails at the same time, with the guide bushing following the fingers of the finger template. The width of the pin and tail boards with such jigs is limited by the width of the front and top hold down bars, and by the distance between the legs of the finger template. U.S. Pat. No. 2,764,191 to Hartmann discloses such a dovetail jig for cutting sockets and tails for a dovetail joint at the same time.

[0005] There are many variations to mortise and tenon joints. The mortise is an elongated aperture in a first workpiece with the tenon being cut into the end of a second workpiece to fit into the mortise. A mortise that extends through the first workpiece is known as a "through" mortise while a mortise that does not extend through is "stub" or "blind". Mortise and tenon joints are used in frame and panel casework, rail and stile door construction, and leg and apron joints for furniture. Mortises have been made with a hammer and chisel, a drill and clean up with a chisel, a mortising machine, and a multi-router machine. Tenons have been made with hand saws, power saws, and multi-router machines. Industrial machines are also available for making mortises and tenons.

[0006] A finger template is known for making mortise and tenon joints with the above described jig base. However, this mortise and tenon template has the above described width limitations. This finger template can only make mortise and tenon joints to mount shelves in the sides of cabinets, and is not suitable for making mortise and tenon joints for other furniture and cabinet construction. The guide bushing contacts the fingers on only one side with this finger template, making straight cuts difficult. If a forward shoulder, as well as the side shoulders, is to be cut for a tenon, the guide bushing must move across the forward finger ends. The router is then only partially supported and can tip, creating an unstable and potentially hazardous condition. U.S. Pat. No. 4,428,408 to Grisley discloses a dovetailing jig, including a finger template for making mortise and tenon joints, that is subject to these same limitations.

DISCLOSURE OF THE INVENTION

[0007] A mortise and tenon joint adapter system for use with a jig base and a router includes a template support, a mortise shelf, a mortise template, a tenon template and a layout guide. The template support mounts on the top surface of the jig base and is secured with the jig base top hold down bar. The mortise shelf is secured to the jig base front surface by the jig base front hold down bar, and is vertically adjustable. The mortise shelf includes a sliding clamp and shelf hold down bars to secure a laterally extending mortise workpiece. The mortise and tenon templates alternately mount on the template support and are adjustable forwardly and rearwardly. Mortising slots and tenoning slots on the mortise and tenon templates, respectively, provide two sided guidance for a guide bushing on the router, and movable stops in the mortising and tenoning template provide length adjustment for mortises and tenons. The layout guides provides precise layout for mortises and tenons, and compensates for the difference between the size of the guide bushing and the size of the router bit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Details of this invention are described in connection with the accompanying drawings that bear similar reference numerals in which:

[0009] **FIG. 1** is a perspective view of a mortise and tenon system embodying features of the present invention, configured in the mortise mode.

[0010] **FIG. 2** is a perspective view of the mortise and tenon system of **FIG. 1**, configured in the tenon mode.

[0011] **FIG. 3** is a perspective view of the template support of the mortise and tenon system of **FIG. 1**.

[0012] **FIG. 4 a** top plan view of a mortise shelf for the mortise and tenon system of **FIG. 1**.

[0013] **FIG. 5** is a sectional view taken along line **5-5** of **FIG. 4**.

[0014] **FIG. 6** is a sectional view taken along line **6-6** of **FIG. 4**.

[0015] **FIG. 7 a** top plan view of a mortise template for the mortise and tenon system of **FIG. 1**.

[0016] **FIG. 8** is a sectional view taken along line **8-8** of **FIG. 7**.

[0017] **FIG. 9** is a sectional view taken along line **9-9** of **FIG. 7**.

[0018] **FIG. 10** is a top plan view of a tenon template for the mortise and tenon system of **FIG. 1**.

[0019] **FIG. 11** is a top plan view of a layout guide for the mortise and tenon system of **FIG. 1**.

[0020] **FIG. 12** is a top plan view of a combined mortise and tenon template for the mortise and tenon system of **FIG. 1**.

[0021] **FIG. 13** is a perspective view of a mortise and tenon created with the mortise and tenon system of **FIG. 1**.

DETAILED DESCRIPTION OF THE INVENTION

[0022] Referring now to **FIGS. 1, 2** and **11**, a mortise and tenon joint adapter system **10**, embodying features of the present invention, for use with a jig base **11** includes a template support **12**, a mortise shelf **14**, a mortise template **15**, a tenon template **16** and a layout guide **17**. The jig base **11** suitable for use with the system **10** has a substantially flat, horizontal top surface **20** and a substantially flat, vertical front surface **21**. A top hold down bar **23** is spaced above and extends laterally across the top surface **20**, and a front hold down bar **24** is spaced in front of and extends laterally across the front surface **21**. The top and front hold down bars **23** and **24** are secured to the top and front surfaces **20** and **21**, respectively, at opposite ends by cam action clamps, threaded studs with wings nuts, or other suitable means. The jig base **11** is generally available commercially with a dovetail finger template or other template that is removed when the jig base **11** is used with the present invention.

[0023] The template support **12**, shown in **FIG. 3**, has a substantially rectangular shape with a flat bottom face **26** and a spaced top face **27**. The top face **27** includes rectangular, flat front portion **28**, a rectangular, flat rear portion **29** that is spaced downwardly from the front portion **28**, and a transverse step face **30** that extends between the front and rear portions **28** and **29**. A front face **31** extends between the bottom face **26** and the front portion **28** of the top face **27**. Two spaced, elongated template guides **33** mount on the front portion **28** of the top face **27**, extending perpendicular to the front face **31**. Two vertical, spaced, threaded template securing apertures **34** are provided in the front portion **28** of the top face **27**, between the template guides **33** and preferably aligned parallel to the front face **31**. The template support **12** mounts on the jig base **11** with the bottom face **26** of the template support **12** on the top surface **20** of the jig base **11**, and the top hold down bar **23** extending over the rear portion **29** of the top face **27** of the template support **12**. Preferably, the front face **31** of the template support **12** is flush with the front surface **21** of the jig base **11**.

[0024] Referring to **FIGS. 4, 5** and **6**, the mortise shelf **14** include a flat, elongated shelf portion **36** and a support portion **37** that is attached to one of the longer edges of the shelf portion **36** and extends perpendicular to the shelf portion **36**. The support portion **37** is sized and shaped to mount on the front surface **21** of the jig base **11** with the front hold down bar **24** clamping the support portion **37** under the shelf portion **36**. The support portion **37** includes a raised portion **38** that extends above the shelf portion **36**. The mortise shelf **14** is vertically adjustable, and is adjusted by loosening the front hold down bar **24**, moving the support portion **37** up or down relative to the front surface **21** of the jig base **11**, and then retightening the front hold down bar **24**.

[0025] The shelf portion **36** has spaced, opposed end sections **40** that extend laterally beyond the ends of the jig base **11** and rearwardly beyond the front surface **21** of the jig base **11**. A shelf hold down bar **41** in each end section **40** extends perpendicular to the front surface **21** and is secured by two spaced threaded bolts **42** that extend upwardly through the respective end section **40**, through springs **43**, through opposite ends of the shelf hold down bar **41**, and into wing nuts **44**.

[0026] A sliding clamp **46** has a laterally elongated, flat, horizontal base portion **47** and a upwardly projecting raised portion **48** along the rearward edge of the base portion **47**. Two spaced clamp slots **49** extend rearwardly from the front edge of the base portion **47**, perpendicular to the raised portion **48**. The sliding clamp **46** is secured to the top of the shelf portion **36** of the mortise shelf **14**, with the raised portion **48** opposite the raised section **38** of the support portion **37** of the mortise shelf **14**, by two threaded bolts **50** that each extend downwardly through a washer **51**, one of the clamp slots **49**, the shelf portion **36** and another washer **51** with a wing nut **52** being threaded onto the bolt **50**. The clamp slots **49** provide forward and rearward adjustability for the sliding clamp **46**.

[0027] The mortise template **15**, as shown in **FIGS. 7, 8** and **9**, is a flat rectangular plate sized and shaped to mount on the front portion **28** of the top face **27** of the template support **12** between the template guides **33**. Preferably the mortise template **15** is at least as thick as the template guides **33**. Two elongated, spaced mortise template support slots **55** through the mortise template **15** extend parallel to the template guides **33** with each being aligned with one of the template support apertures **34**. A machine screw **57**, with a washer **58**, extends through each mortise template support slot **55** and into a template support aperture **34**. The mortise template support slots **55** each have a widened upper channel **59** sized and shaped to receive the head of the machine screw **57** and the washer **58** so that the top of the machine screw **57** is below the top of the mortise template **15** when the machine screw **57** is tightened in the template support aperture **34**. The mortise template support slots **55** provide forward and rearward adjustability for the mortise template **15**.

[0028] The mortise template **15** includes a plurality of spaced first mortising slots **61** perpendicular to the template guides **33** and a plurality of second mortising slots **62** parallel to the template guides **33**. Each of the first and second mortising slots **61** and **62** has an upwardly opening upper channel **64** connected to a downwardly opening lower channel **65** by a narrower intermediate passage **66**. The router **68** used to route mortises and tenons is a plunge router, and has a downwardly extending bit **69** and a bushing guide **70** around the upper part of the bit **69**. The width of the intermediate passage **66** is marginally wider than the guide bushing **70** to provide two sided guidance of the guide bushing **70** and exact positioning of the bit **69**.

[0029] Movable stops **72** include an upper piece **73** sized to fit into the upper channel **64**, a lower piece **74** sized to fit into the lower channel **65**, and a screw **75**. The upper piece **73** has an unthreaded upper piece hole **77** and an upwardly opening upper piece recess **78**, and the lower piece **74** has a threaded lower piece hole **79**. A movable stop **72** is assembled into a first or second mortising slot **61** or **62** with the upper piece **73** in the upper channel **64** and the lower piece **74** in the lower channel **65**. The screw **75** extends through the upper piece hole **77** and the intermediate passage **66**, and threads into the lower piece hole **79**, with the top of the screw **75** in the upper piece recess **78** and below the top of the mortise template **15**.

[0030] The tenon template **16**, as shown in **FIG. 10** is a flat rectangular plate sized and shaped to mount on the front portion **28** of the top face **27** of the template support **12**

between the template guides **33**. Preferably the tenon template **16** is at least as thick as the template guides **33**. Two elongated, spaced tenon template support slots **81** through the tenon template **16** extend parallel to the template guides **33** with each being aligned with one of the template support apertures **34**. The tenon template support slots **81** are sized, shaped and spaced the same as the mortise template support slots **55** shown in **FIG. 8**. The tenon template **16** is secured to the template support **12** with machine screws **57** and washers **58**, in the same manner as the mortise template **15**. The tenon template support slots **81** provide forward and rearward adjustability for the tenon template **16**.

[**0031**] The tenon template **16** includes a plurality of spaced tenoning slots **83**, each having an elongated lateral section **84** extending perpendicular to the template guides **33** and two end sections **85** that extend rearwardly from opposite ends of the lateral section **84**. The size and shape of each tenoning slot **83** is the same as the first and second mortising slots **61** and **62**, with the tenoning slot **83** receiving the movable stops **72** and guiding the bit **69** and guide bushing **70** in the same manner as the first and second mortising slots **61** and **62**.

[**0032**] Referring to **FIG. 11**, the layout guide **17** is a flat piece of transparent material such as plastic. The layout guide has a straight front edge **87** and a plurality of precisely spaced guide lines **88** parallel to the front edge **87**. The distance from the front face **87** to the guide lines **88** is preferably the radius of the guide bushing and the difference between the radius of guide bushing **70** and the radius of the router bit **69**, for different sizes of bit **69** and/or bushing guide **70**.

[**0033**] Referring again to **FIG. 1**, the mortise for the mortise and tenon joint is created with the template support **12** mounted on the top surface **20** of the jig base **11** and secured by the top hold down bar **23**, the mortise template **15** mounted on the template support **12**, and the mortise shelf **14** mounted on the front surface **21** of the jig base **11** and secured by the front hold down bar **24**. The centerline and endpoints of the desired mortise are laid out on the first workpiece **90**, and, using the layout guide, the endpoints are adjusted outward to compensate for the difference between the radius of guide bushing **70** and the radius of the router bit **69**. The first workpiece **90** is mounted on the mortise shelf **14**, and secured with one of the shelf hold down bars **41** and with the sliding clamp **46**. The mortise shelf **14** is raised so that the top of the first workpiece **90** contacts the bottom of the mortise template **15**, the mortise template **15** is adjusted so that the selected first or second mortising slot **61** or **62** is centered on the centerline of the first workpiece **90**, and movable stops **72** are adjusted to the adjusted endpoints on the first workpiece **90**. The router **68** is adjusted for depth and placed over the selected first or second mortising slot **61** or **62**, and the mortise is routed using normal plunge router techniques.

[**0034**] Referring again to **FIG. 2**, the tenon for the mortise and tenon joint is created with the template support **12** mounted on the top surface **20** of the jig base **11** and secured by the top hold down bar **23**, and the tenon template **16** mounted on the template support **12**. The dimensions of the desired tenon are laid out on the second workpiece **91**, and, using the layout guide, all four sides are adjusted inward to compensate for the difference between the radius of guide bushing **70** and the radius of the router bit **69**. The second workpiece **91** is mounted on the front surface **21** of the jig base **11** and secured with the front hold down bar **24**, with the top of the second workpiece **91** contacting the bottom of the tenon template **16**. The tenon template **16** and the second workpiece **91** are adjusted so that the selected tenoning slot **83** is aligned with the adjusted dimensions for two sides of the desired tenon. The movable stop **72** is adjusted to prevent the router bit **69** from contacting the template support **12** or the jig base **11**. Two sides of the tenon are routed. The second workpiece **91** is released, rotated **180** degrees, adjusted, and the other two sides of the tenon are routed.

[**0035**] As shown in **FIG. 12**, the mortise and tenon templates **15** and **16** can alternatively be combined into a single combined template **93**, having first and second mortising slots **61** and **62**, and tenoning slots **83**. As an example and not a limitation, such a template could be used for routing a mortise and then rotated 180 degrees for routing the tenon. Multiple mortise templates **15** and tenon templates **16**, with different layouts and different slot sizes, may be provided. The multiple parallel first mortising slots **61** and second mortising slots **62** shown are provided for multiple mortise applications. The mortise and tenon templates **15** and **16**, with the first and second mortising slots **61** and **62**, and the tenoning slots **83**, firmly support the router **68**, providing a safer jig. The first and second mortising slots **61** and **62**, and the tenoning slots **83** provide two sided guidance for the guide bushing **70**, constraining the guide bushing **70** for easier and more accurate routing of mortises and tenons.

[**0036**] **FIG. 13** shows a mortise **95** in the first workpiece **90** and a tenon **96** in the second workpiece **91** made with the system of the present invention. The present invention provides apparatus for making furniture and cabinet mortise and tenon joints using existing dovetail jigs. The higher front portion **28** of the top face **27** of the template support **12** and the vertically adjustable mortise shelf **14** together allow creation of mortises in thicker work pieces than prior jigs. The shelf hold down bars **41** and sliding clamp **46** of the mortise shelf **14** form a means for clamping a laterally extending mortise workpiece and can secure a long workpiece, such as a table leg, for routing a mortise. The movable stops **72** provide accurate adjustment of the length of mortises and tenons.

[**0037**] Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made by way of example and that changes in details of structure may be made without departing from the spirit thereof.

What is claimed is:

1. A mortise and tenon joint adapter system for making mortises and tenons in work pieces in combination with a jig base having a base top surface, an abutting base front surface, a top hold down bar and a front hold down bar and a router having a bit and a guide bushing, said system comprising:

a template support adapted to mount on said base top surface, and including a top face having a horizontal rear portion and an upwardly spaced, horizontal front portion, said rear portion being secured by said top hold down bar, a mortise shelf including a vertical support portion and a horizontal shelf portion extending for-

wardly from said support portion, said support portion being adapted to mount on said base front surface with vertical adjustability and secured by said front hold down bar under said shelf portion, said mortise shelf including means for clamping a laterally extending mortise workpiece, and at least one template mountable on said front portion of said top face of said template support, and including a mortising slot and a tenoning slot with each said mortising and tenoning slot being sized to provide two sided guidance of said guide bushing.

2. The system as set forth in claim 1 wherein each said template is adjustable forwardly and rearwardly relative to said template support.

3. The system as set forth in claim 2 wherein said front portion of said top face of said template support includes two laterally spaced, upwardly projecting template guides that extend perpendicular to said base front surface, and two laterally spaced threaded template support apertures between said template guides, and

each said template is sized to fit between said template guides, and includes a pair of spaced template support slots parallel to said template guides that are located one each over a said template support aperture and a pair of threaded fasteners that each extend through a said template support slot and into a said template support aperture.

4. The system as set forth in claim 1 wherein said at least one template includes a plurality of mortising slots and a plurality of tenoning slots.

5. The system as set forth in claim 4 wherein said at least one template includes a mortise template having said mortising slots and a tenoning template having said tenoning slots.

6. The system as set forth in claim 1 wherein said template includes a plurality of first mortising slots parallel to said base front surface and a plurality of second mortising slots perpendicular to said first mortising slots.

7. The system as set forth in claim 1

wherein each said mortising slot and tenoning slot has an upwardly opening upper channel, a downwardly opening lower channel and an intermediate passage connecting said upper and lower channels, and

said template includes at least one slidably adjustable movable stop having an upper piece sized and shaped to fit into a said upper channel, a lower piece sized and shaped to fit into a said lower channel, and a screw connecting said upper and lower pieces.

8. The system as set forth in claim 1 wherein said tenoning slot includes a laterally extending lateral section and a pair of spaced end sections that extend rearwardly from opposite ends of said lateral section.

9. The system as set forth in claim 1 wherein said shelf portion of said mortise shelf includes a pair of spaced, opposed end sections that extend laterally beyond jig base, said support portion includes a raised section that extends above said shelf portion, and said means for clamping includes a shelf hold down bar on each said end section and a sliding clamp opposite said raised section, said sliding clamp being forwardly and rearwardly adjustable, and having a raised portion that, in combination with said raised section of said support portion, clamps said mortise workpiece.

10. The system as set forth in claim 1 including a layout guide having a front edge and a plurality of spaced guide lines at selected precise distances from and parallel to said front edge, with said distances being selected as the radius of said guide bushing and the difference between the radius of said guide bushing and the radius of said bit, for different said guide bushing and bit sizes.

11. A mortise and tenon joint adapter system for making mortises and tenons in work pieces in combination with a jig base having a base top surface, an abutting base front surface, a top hold down bar and a front hold down bar and a router having a bit and a guide bushing, said system comprising:

a template support adapted to mount on said base top surface, and including a top face having a horizontal rear portion and an upwardly spaced, horizontal front portion, with said rear portion being secured by said top hold down bar, said front portion including two laterally spaced, upwardly projecting template guides that extend perpendicular to said base front surface and two laterally spaced threaded template support apertures between said template guides,

a mortise shelf including a vertical support portion and a horizontal shelf portion extending forwardly from said support portion, said support portion being adapted to mount on said base front surface with vertical adjustability and to be secured by said front hold down bar under said shelf portion, said support portion including a raised section that extends above said shelf portion, said shelf portion including a pair of spaced, opposed end sections that extend laterally beyond jig base with each said end section having a shelf hold down bar, said shelf portion including a sliding clamp opposite said raised section, said sliding clamp being forwardly and rearwardly adjustable, and having a raised portion that, in combination with said raised section of said support portion and further in conjunction with one of said shelf hold down bars, clamps a mortise workpiece,

a mortise template sized and shaped to mount on said front portion of said top face of said template support between said template guides, and having a pair of spaced elongated mortise template support slots extending parallel to said template guides and located one each over a said template support aperture, and a machine screw extending through each said mortise template support slot into a said template support aperture, said mortise template including a plurality of spaced first mortising slots perpendicular to said mortise template support slots sized to provide two sided guidance of said guide bushing and a plurality of spaced second mortising slots parallel to said mortise template support slots sized to provide two sided guidance of said guide bushing, said first and second mortising slots each having an upwardly opening upper,channel, a downwardly opening lower channel and an intermediate passage connecting said upper and lower channels, and said first and second mortising slots having slidably adjustable movable stops each having an upper piece sized and shaped to fit into a said upper channel, a lower piece sized and shaped to fit into a said lower channel, and a screw connecting said upper and lower pieces,

a tenon template sized and shaped to mount on said front portion of said top face of said template support between said template guides, and having a pair of spaced elongated tenon template support slots extending parallel to said template guides and located one each over a said template support aperture, and a machine screw extending through each said tenon template support slot into a said template support aperture, said tenon template including a plurality of spaced tenoning slots sized to provide two sided guidance of said guide bushing, each said tenoning slot having a laterally extending lateral section and a pair of spaced end sections that extend rearwardly from opposite ends of said lateral section, each said tenoning slot having an upwardly opening upper channel, a downwardly opening lower channel and an intermediate passage connecting said upper and lower channels, said tenoning slots having slidably adjustable movable stops each having an upper piece sized and shaped to fit into a said upper channel, a lower piece sized and shaped to fit into a said lower channel, and a screw connecting said upper and lower pieces, and

a layout guide having a front edge and a plurality of spaced guide lines at selected precise distances from and parallel to said front edge, with said distances being selected as the radius of said guide bushing and the difference between the radius of said guide bushing and the radius of said bit, for different said guide bushing and bit sizes.

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